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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/687,743 | 10/20/2003 | Kiyofumi Sakaguchi | 00862.022497.1 | 9261 |
| 5514 | 7590 | 10/13/2004 | EXAMINER | |
| FITZPATRICK CELLA HARPER & SCINTO 30 ROCKEFELLER PLAZA NEW YORK, NY 10112 | | | LE, THAO X | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2814 | |

DATE MAILED: 10/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|----------------------------------|--|
| Office Action Summary | Application No. 10/687,743 | Applicant(s) SAKAGUCHI ET AL. | |
| | Examiner Thao X Le | Art Unit 2814 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-33 and 35 is/are rejected.
- 7) ☒ Claim(s) 34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 10/059,116.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>11/20/03 & 05/25/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-22 are cancelled.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claims 23-33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP1061566 to Takao et al in view of JP 11-317509 to Omi et al.

Regarding claim 23, Takao discloses a method of manufacturing a semiconductor device, the method comprising: anodizing a semiconductor substrate 301 [0027] to form a porous semiconductor layer 302 on a semiconductor region of the semiconductor substrate 302, fig. 3B; forming a non-porous semiconductor layer 303 [0028] on the porous semiconductor layer 302;

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forming a semiconductor element 304 and/or semiconductor integrated circuit in the non-porous semiconductor layer 303; forming kerfs (separation line between 303-1 and 303-2) from a surface side of the non-porous semiconductor layer 303 toward the semiconductor region and separate the semiconductor element 303-1 from the substrate 301 by separation force 307.

But Takao does not expressly disclose the method wherein applying a pressure of a fluid to the porous semiconductor layer such that a desired region of the semiconductor element and/or semiconductor integrated circuit is separated from the semiconductor substrate.

However, Omi reference discloses a method wherein applying a pressure of a fluid 402, drawing 7, to the porous semiconductor layer 23, drawing 8, such that a desired region of the semiconductor element and/or semiconductor integrated circuit is separated from the semiconductor substrate. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the pressure of fluid to separate the porous layer from the substrate teaching of Omi to replace the pulling force of Takao, because it would have separated the layer easily without damaging the separated substrate as taught by Omi, abstract.

Regarding claim 24, Takao discloses the method wherein the semiconductor substrate 301 is a single-crystal silicon substrate or a compound semiconductor substrate [0027].

Regarding claims 25-26, 28, Takao discloses the method wherein the plurality of layers having different porosities are formed by changing a density of current in the anodizing step [0020]

But, Takao does not disclose the method wherein the porous semiconductor layer comprises a plurality of layers having different porosities and a first porous semiconductor layer having a first porosity and a second porous semiconductor layer having a second porosity greater than the first porosity,

However, Omi reference discloses the porous semiconductor layer comprises a plurality of layers 22/23 having different porosities, drawing 8, wherein the plurality of layers having different porosities are formed by changing a density of current in the anodizing step [0111]-[0139]. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the teaching of Omi with Takao's method, because it would have separated the layer easily without damaging the separated substrate as taught by Omi, abstract.

Regarding claim 27, Takao discloses the method according wherein the non-porous semiconductor layer 303 is formed on the first porous semiconductor layer 302.

Regarding claim 29, Takao does not disclose the method further comprising forming a protective film on inner walls of pores in the porous semiconductor layer.

However, Omi reference discloses the method further comprising forming a protective film on inner walls of pores in the porous semiconductor layer [0113]. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use teaching of Omi with Takao's method, because it would have separated the layer easily without damaging the separated substrate as taught by Omi, abstract.

Regarding 30-33, Takao discloses the method wherein the non-porous semiconductor layer 303 is a single-crystal silicon layer or a compound semiconductor layer [0028], wherein the

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kerfs are formed by any one of dicing, etching, laser abrasion, ultrasonic cutter and high-pressure jet [0018], wherein the kerfs are formed such that bottom portions of the kerfs are located in the porous semiconductor layer or at an interface between the non-porous semiconductor layer 303 and the porous semiconductor layer 302, fig. 3B.

Regarding claim 35, Takao does not disclose the method wherein the semiconductor element and/or semiconductor circuit comprises any one of CMOS, bipolar transistor, diode, coil, capacitor, DRAM, microprocessor, logic IC and memory. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the teaching of Takao as claim for intended used, MPEP 2111.02.

Allowable Subject Matter

5. Claim 34 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record fails to disclose the separation of the desired region is performed by injecting high-pressure fluid from the kerfs.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le
04 Oct 2004

LONG PHAM
PRIMARY EXAMINER